Internet of Things in Road Safety

Gourisankar G[1], Gayathri Manjesh[2], Sebastian Cyriac[3]

Student[1], Student[2], Project Manager[3]
Santhigiri College of Computer Sciences[1,2], Embase Pro Suit Pvt Ltd[3]
Vazhithala, Idukki- India[1,2], Swift current, Saskatchewan- Canada[3]

Abstract:This You pick up a newspaper and you will find at least one or two reports about traffic accidents every day. They cause loss of life and material. People need to be more careful on the road, no matter what mode of transport you come from. Even those who walk are not safe due to the increase in these cases. So here I propose two devices where we can ensure road safety. In the first scenario, we designed an embedded device based on Arduino and a GSM module with GPS to send an emergency message with location and generate an alarm to mitigate and ensure the safety of people. This device notifies the police control center as well as family and friends. In the second scenario, we are developing a device to alert drivers who are drowsy while driving. We are concerned with a drowsy driver warning system developed using a technique in which video stream processing (VSP) is analyzed by the concept of eye blink using eye aspect ratio (EAR) and Euclidean eye distance.

Keywords: Arduino, GSM, VSP, EAR, Drowsy etc.

I. INTRODUCTION

As we all read the newspaper or watch the news headlines, one thing that is never missing from our daily headlines are the concerns regarding the safety of people at night and that is why many do not feel safe to step out. As the world gradually evolves, the security sector has advanced in terms of evolving existing technology but has yet to fully embrace the technology to its fullest value. To reduce the problems related to human security, we are working on the concept of incorporating robotics into the security sector, i.e., night patrol robot. Second, driver fatigue has been a major concern in countless accidents caused by fatigue, tiring road conditions, and adverse weather conditions.

Each year, the National Highway Traffic Safety Administration (NHTSA) and the World Health Organization (WHO) report that approximately 1.35 million people die from vehicle accidents worldwide. In general, traffic accidents usually occur as a result of inappropriate driving. These situations occur when the driver is addicted to alcohol or sleepy. The maximum types of fatal accidents are considered to be a serious factor in driver fatigue. When drivers fall asleep, they lose control of the vehicle. There is a need to design a smart or intelligent vehicle system through advanced technology. This document implements a mechanism to warn the driver of drowsiness or daydreaming.

II. NIGHT PATROL ROVER BOT

The construction of a wristwatch/Smart gadget. The block diagram for the women's safety gadget, which we can refer to as [2] a smart safety watch, is shown in (Figure1.1) [2]. In this watch, there is a SOS button built into the watch/gadget, in the event of an emergency, women must click the button, which causes the Arduino nano to read the input and collect the precise position of the person/women and send the location information, such as latitude and longitude values, to the phone number specified, such as friends, parents, or the police station this Aids in tracking the exact location. The Arduino nano sends the obtained location to the robot microcontroller, which assists the robot in reaching the location by sounding a siren. This [2] mechanism is triggered for self-defense, and a notification is sent to the touch [2]. Arduino IDE was used to write the input code in this project. We will be using a robot with an Arduino Mega, whichis a microcontroller board that will serve as the robot's main operating device, as well as a compatible motor controller that will act as an intermediary between the microcontroller, batteries, and motors, in our work. A Bluetooth module is also attached to the robot body in order to have a communication between the user's deviceand the robot, in order to exchange the longitudinal and latitude values to locate the exact location ,by using the GPS module which works by receiving information from GNSS satellites and then calculate the devicesgeographical position therefore the location from the person wearing our wrist band and so on, our robot will also be having a hmc5883l magnetometer/compass and theultrasonic motion sensors for the better tracking and reaching the location.

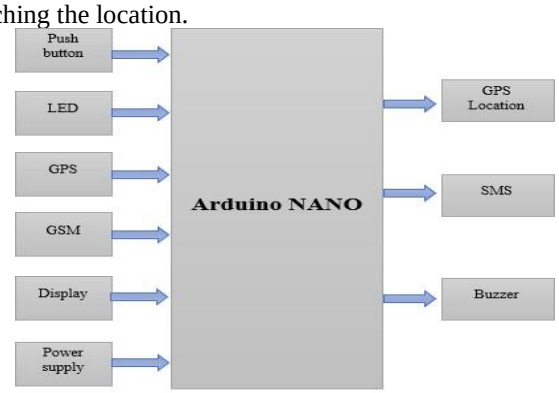

Fig 1.1: Proposed Design of Wrist Band

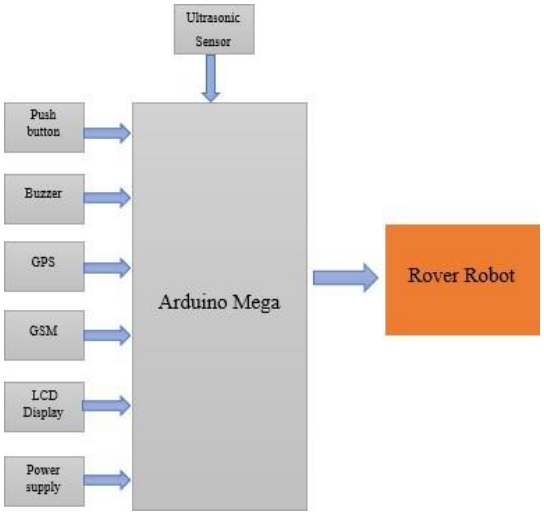

Fig 1.2: Proposed Design of Rover Bot

III. DROWSY DETECTION DEVICE

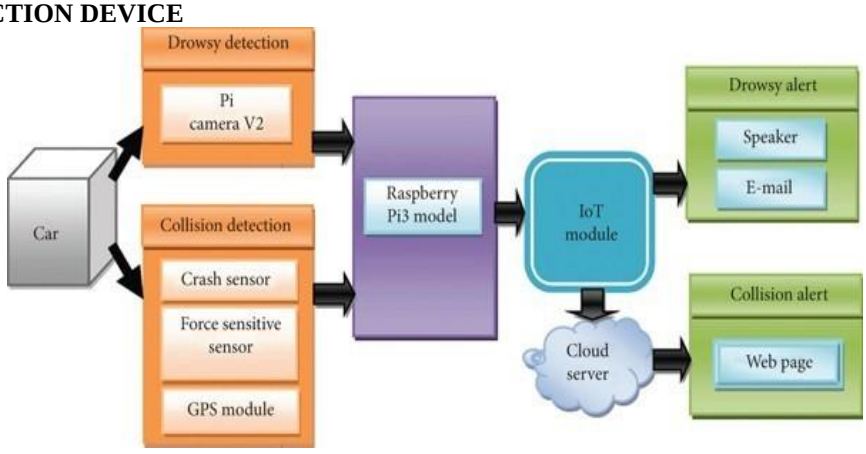

Fig 1.3: Proposed Design of Drowsy Detection Device

The system proposed here is designed to minimize the occurrence of countless accidents caused by drowsy drivers. Nowadays, driver fatigue causes traffic accidents all over the world every moment. Thus, these activities should be required for the automatic processing of the implementation of an intelligent warning system or vigilance in the vehicle, which is the goal of this system. In order to analyze different behavioral or visual attitudes of the driver, facial movements and eye blinks are measured to detect the driver's state. Here, blinking is mainly aimed at detecting driver drowsiness. The EAR threshold lies above 0.25 without any depletion effect. When the driver automatically shuts down, then the EAR threshold falls below the given range. The sleepy blink sample threshold is the number of video frames with the driver's eyes closed. If the number of consecutive frames increases above the threshold range, driver drowsiness is detected. Here, the Pi camera is used to periodically record the total eye movement to calculate the EAR threshold. A counter for counting the occurrence of images is also included. Suppose it exceeded the range of 30.

In this case, a voice signal is activated by the speaker and an email is automatically sent to the authorized person of the vehicle, which is usually processed at the time of drowsiness detection.

The described modules work correctly through the Raspberry Pi3, which is programmed in the Python programming language.

The step-by-step methods are as follows:

- Step 1: Recording video
- Step 2: Face detection
- Step 3: Eye detection
- Step 4: Drowsiness detection (combination of steps 2 and 3)

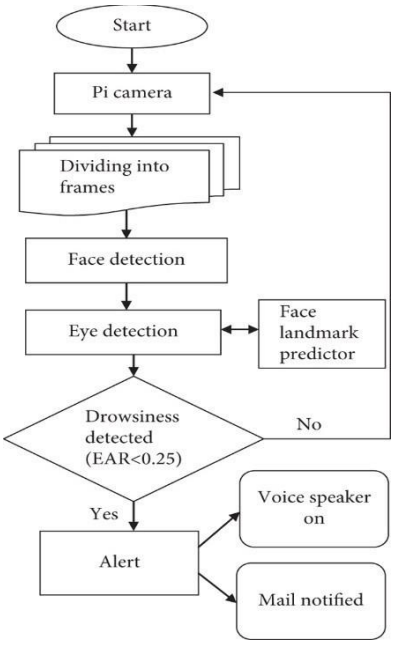

Fig 1.4: Flowchart of Drowsy Detection

IV. CONCLUSION AND FUTURE SCOPE

The first proposed concept is a human protection and safety system that combines robotics and wireless technologies. Built-in system based on Arduino and GSM module with GPS is designed and built to send emergency message and sound alert to pre-defined numbers. This whole mechanism takes place within a short period of time and helps the victim to get the maximum benefit of salvation. For future improvements, we can use IOT to control the robotic vehicle. The main purpose of this paper is to ensure human safety and security and achieve a cost-effective and user-friendly device.

The second proposed concept is a robust method for detecting the drowsiness of drivers nowadays. [6] This method generally combines two different systems in one integrated system [6]. However, existing techniques are based on a psychological or vehicle-based approach to detect driver drowsiness and also measure crash severity separately, but such a technique is highly intrusive and fully affects the physical environment. Thus, the proposed system is used to construct a non-intrusive technique for measuring driver drowsiness with the severity of a collision due to braking or an accident. For future, we can prevent most of the accidents and reduce accident as well as death rate using history of each driver's drowsiness.

V. ACKNOWLEDGMENT

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